



Serial No.: 09/682,502
Confirmation No.: 7905
Applicant: DANIELSSON, Mats
Atty. Ref.: 06730.0010.NPUS00

REMARKS:

REMARKS REGARDING SPECIFICATION AMENDMENTS:

The above noted amendments to the specification have been made in response to the Examiner objection of the specification. Specifically, a new paragraph has been inserted after paragraph 18 so as to include a brief description of Figure 3 as part of the Brief Description of the Drawings. Also, paragraph 0028 has been amended to make reference to Figure 3. No additional amendments are needed because each item in Figure 3 has been previously described in the specification.

Applicant submits that no new matter is introduced by the proposed amendments to the specification.

REMARKS REGARDING CLAIMS AMENDMENTS:

The above noted amendments to the claims have been made so that the scope and language of the claims is more precise and clear in defining what the Applicant considers to be the invention.

Specifically, an amendment to claim 1 has been made so as to position the collimator in a position substantially perpendicular to the incident radiation and spaced apart from the detector. Such an arrangement is clearly shown in Figures 2 and 3 and is described in the corresponding text. Further, claim 1 has been amended so as to clarify that it is the collimator that serves to exclude at least one section between at least one edge of the detector and at least one active sensor area.

With regard to the amendments to claim 3, structural language has been added to the claim as a basis for the functional language previously presented. In particular, means for orienting the X-ray detector relative to the incident radiation has been positively recited. Further the claim has been amended to provide structure to the functional language of the last phrase of the claim.

Support for the above amendments to the claims can be found in the original specification as filed in the following locations:



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Amendment Support in Original Specification:
to Claim:

- | | |
|---|-----------------------------------------------------------------|
| 1 | Original claim 1, paragraphs 19-30 and original Figures 1 and 2 |
| 3 | Original claim 3, paragraphs 19-30 and original Figures 1 and 2 |

The claims and amended claims are submitted as being clearly distinct and patentable over the art of record and therefore their entry and allowance by the Examiner is requested.

IN RESPONSE TO THE OFFICE ACTION:

FIRST REJECTION UNDER 35 U.S.C. § 103:

Claims 3, and 9 - 13 have been rejected under 35 U.S.C. §103(a) as being unpatentable given U.S. Patent No. 4,937,453 issued to Robert S. Nelson (the Nelson reference).

Applicants request that the Examiner reconsider and withdraw the above rejection of the claims in view of the following:

A determination under 35 U.S.C. §103 is whether the claimed invention as a whole would have been obvious to a person of ordinary skill in the art at the time the invention was made. *In re Mayne*, 104 F.3d 1339, 1341, 41 USPQ 2d 1451, 1453 (Fed. Cir. 1997). An obviousness determination is based on underlying factual inquiries including: (1) the scope and content of the prior art; (2) the level of ordinary skill in the art; (3) the differences between the claimed invention and the prior art; and (4) objective evidence of nonobviousness. *Graham v. John Deere Co.*, 383 U.S. 1, 17-18, 148 USPQ 459, 467 (1966), see also *Robotic Vision Sys., Inc. v. View Eng'g Inc.*, 189 F.3d 1370, 1376, 51 USPQ 2d 1948, 1953 (Fed. Cir. 1999)

In line with this standard, case law provides that "the consistent criterion for determination of obviousness is whether the prior art would have suggested to one of ordinary skill in the art that this process should be carried out and would have a reasonable likelihood of success, viewed in the light of the prior art." *In re Dow Chem.*, 837 F.2d 469, 473, 5 USPQ 2d 1529, 1531 (Fed. Cir. 1988). The first requirement is that a showing of a suggestion, teaching, or motivation to combine the prior art references is an "essential evidentiary component of an obviousness holding." *C.R. Bard, Inc. v. M3 Sys. Inc.*, 157 F.3d 1340, 1352, 48 USPQ 2d 1225, 1232 (Fed. Cir. 1998). This showing must be clear and particular, and broad conclusory statements about the teaching of multiple references, standing alone, are not "evidence." *In re Dembiczak*, 175 F.3d 994, 1000, 50 USPQ2d 1614, 1617. The second requirement is that the ultimate determination of obviousness must be based on a reasonable expectation of success. *In re O'Farrell*, 853 F.2d 894, 903-904, 7 USPQ 2d 1673, 1681 (Fed. Cir. 1988); see also *In re Longi*, 759 F.2d 887, 897, 225 USPQ 645, 651-52 (Fed. Cir. 1985). The mere fact that the prior

art may be modified in the manner suggested by the Examiner does not make the modification obvious unless the prior art suggested the desirability of the modification. *In re Fritch*, 972 F.2d 1260, 1265, 23 USPQ 2d 1780, 1783-84 (Fed. Cir. 1992).

The examiner bears the burden of establishing a prima facie case of obviousness. *In re Deuel*, 51 F.3d 1552, 1557, 34 USPQ 2d 1210, 1214 (Fed. Cir. 1995). The burden to rebut a rejection of obviousness does not arise until a prima facie case has been established. *In re Rijckaert*, 9 F.3d 1531, 1532, 28 USPQ 2d 1955, 1957 (Fed. Cir. 1993). Only if the burden of establishing a prima facie case is met does the burden of coming forward with rebuttal argument or evidence shift to the applicant. *In re Deuel*, 51 F.3d 1552, 1553, 34 USPQ 2d 1210, 1214 (Fed. Cir. 1995), see also *Ex parte Obukowicz*, 27 USPQ 2d 1063, 1065 (B.P.A.I. 1992).

The Nelson reference is discussed in paragraph 0005 of the 'Background of Invention' section of the present Specification. As previously indicated, the detector of Nelson includes a conventional silicon type strip detector having a plurality of parallel elongated aluminum strips 12 deposited on one surface of the silicon substrate 10 (col. 3, lines 56-61). Electrical connections 18 are provided from the aluminum strips 12 to an amplifier 20 (col. 3, lines 66-68). The detector has a thickness T, height H and length L (col. 4, lines 3-4).

The figures found in Nelson illustrate various applications of the Nelson invention. As mentioned in the Specification of the present application, Nelson discloses in Figure 1 a silicon x-ray detector that is oriented edge-on to the incident beam. Because silicon micro-strip detectors are produced on thin (*i.e.*, several hundred microns) wafers, they are used in an edge-on geometry such that the photons hit the detector from the side or face 11 and are absorbed the length of the strip (col. 4, lines 7-12). For this edge-on orientation illustrated in Figure 1, the height H of the detector is chosen such that substantially all of the energy of the incident collimated x-rays 22 is discharged while passing through the length L of the detector (col. 4, lines 12-15).

Figures 4, 5 and 6a illustrate use of the Nelson invention in slit scanning applications. In this application, an x-ray slit collimator 42 is laid over the detector and moves along the surface of the detector that the strips 12 are found on (col. 6, lines 15-19; *see also*, Figures 4, 5 and 6a).

The detector remains stationary in this application (col. 6, line 15; col. 7, lines 5-7). Further as one of skill in the art will note, these figures do not illustrate any exclusion of the dead areas. On the contrary, the entire detector appears to be radiated. Further as indicated in the Specification, Nelson does not consider the dead areas at all.

Applicant submits that nothing in the art of record teaches or suggests the present invention. As positively recited in independent claim 3, the present invention is directed to an apparatus for detection of incident radiation in radiographic imaging in which the apparatus includes an X-ray detector able to be oriented relative to the incident radiation; means for orienting the X-ray detector relative to the incident radiation at an acute angle between a direction of the incident radiation and a side of the detector of the sufficient height such that incident radiation mainly hits the side of the detector, the angle being less than ten (10) degrees. Further as is recited in the claim, the x-ray detector has a plurality of semiconductor X-ray strips arranged on a substrate, and the detector is of sufficient height such that substantially all of the incident radiation dissipates within the detector. Electrical outputs for each of the strips and electrical connections between each of the semiconductor X-ray strips are such that there is an output corresponding to corresponding points in each of the strips is combined. Finally, as is positively recited in claim 3, the apparatus further includes a collimator that is arranged substantially perpendicular to the incident radiation. Apertures of the collimator are arranged and spaced apart from the side of the detector hit by the incident radiation, the apertures excluding at least one section of the detector between at least one edge of the detector and at least one active sensor area from the incident radiation. Applicant submits that nothing in the Nelson reference teaches or suggests any exclusion of the dead areas as is positively recited in independent claim 3.

Further, to the extent that claims 9-13 are dependent upon claim 3, under the provisions of 35 U.S.C. §112, 4th paragraph, all of the limitations of claim 3 are expressly and inherently recited in claims 9-13. Applicant submits that the above arguments are equally applicable to the rejection of claim 9-13 and therefore nothing in the Nelson reference teaches or suggests the subject matter of claims 9-13.

Given the above, Applicant requests that the rejection of claims 3, and 9 - 13 under 35 U.S.C. §103(a) be reconsidered and withdrawn and that the Examiner indicate the allowance of the claims in the next paper from the Office.

SECOND REJECTION UNDER 35 U.S.C. § 103:

Claims 1-2, 4, and 6-7 have been rejected under 35 U.S.C. §103(a) as being unpatentable given U.S. Patent No. 4,937,453 issued to Robert S. Nelson (the Nelson reference) in view of U.S. Patent No. 5,227,635 issued to Jan S. Iwanczyk (The Iwanczyk reference).

Applicant requests that the Examiner reconsider and withdraw the above rejection of the claims in view of the following:

The applicable case law for a rejection under 35 U.S.C. §103 has been discussed above in the response to the first rejection under 35 U.S.C. §103. In the interests of brevity, Applicant requests the Examiner to note the above sections and consider that material incorporated herein by reference.

Nelson was discussed above; those arguments being incorporated herein. As shown, Nelson teaches placing a detector so that it is radiated on its edge (Figure 1 of Nelson) or on its face containing the strips 12 (Figure 6a of Nelson). Regarding the Examiner's statement that "[a]lthough *Nelson* does not disclose the particular angle as being selected to be less than about 10 degrees, absent some degree of criticality, it would have been a matter of obvious design choice. . . to choose the optimum angle", Applicants strongly disagree. It is well known in the art that silicon microstrip detectors such as taught by Nelson are produced on thin (*i.e.*, only several hundred microns thick) wafers. Because they are thin, an "edge-on" geometry is employed where the photons hit the detector from the side and are absorbed along the whole length of the strip. As is clearly stated by Nelson, "[i]n this way the x-ray stopping power of the detector is increased" (col. 4, lines 15-16). In slit scanning applications, the x-ray is applied through the slit collimator 42 to the face of the detector where the strips 12 are found, with the collimator 42 moving along the surface of the detector (Figure 6a; col. 6, lines 18-19), a ninety degree change in the direction of the application of the radiation. For this reason, one skilled in

the art would only be motivated to apply the radiation edge-on, or directly to the face of the detector where the strips are found.

Referring to Iwanczyk, therein is disclosed a mercuric iodide x-ray detector 10. One of skill in the art would immediately know and understand that the silicone based detectors of Nelson and the mercury iodide detectors of Iwanczyk are completely different in their characteristics and function. The Iwanczyk detector 10 includes an entrance electrode 17, an entrance surface 18, a backside surface 13 (of the entrance electrode 17), a collection electrode 12, a disc-shaped body 11 of Mercuric Iodide, a shield 21 overlying the entrance electrode 17, and a guard ring 15 (col. 2, lines 14-38). The detectors disclosed in the Iwanczyk reference must be perpendicular to the incident radiation to be able to absorb the entire energy from the incident radiation making the image contrast. Iwanczyk provides no teaching or suggestion as to the orientation of the detector with respect to incident radiation, as is claimed in independent claims 1 and 3 and therefore their dependent claims. Further, Iwanczyk does not teach or suggest an angle of orientation of 10 degrees or less. Accordingly, Iwanczyk adds nothing to Nelson; Nelson, alone or in combination with Iwanczyk, does not teach or suggest the presently claimed invention.

In addition Applicant notes that the Iwanczyk reference does not utilize a collimator. Rather, a guard ring (21) is attached to the detector via a spacer and thus would follow any orientation of the detector. As is positively recited in claim 1, the present invention utilizes a collimator that is substantially perpendicular to the incident radiation and is spaced apart from the detector. Thus Applicant submits that nothing in the Nelson reference, alone or in combination with Iwanczyk teaches or suggests the invention as recited in the claims.

Further to the extent that claims 2, 4, 6-7 are dependent upon independent claims 1 and 3, under the provisions of 35 U.S.C. §112, 4th paragraph, all of the limitations of these independent claims are expressly and inherently recited in claims 2, 4, 6-7. Applicant submits that the above arguments are equally applicable to the rejection of claims 2, 4, 6-7 and therefore nothing in the Nelson reference, alone or in combination with Iwanczyk teaches or suggests the subject matter of claims 2, 4, 6-7.

Given the above, Applicant requests that the rejection of claims 1-2, 4, and 6-7 under 35 U.S.C. §103(a) be reconsidered and withdrawn and that the Examiner indicate the allowance of the claims in the next paper from the Office.

THIRD REJECTION UNDER 35 U.S.C. § 103:

Claim 8 has been rejected under 35 U.S.C. §103(a) as allegedly being unpatentable given U.S. Patent No. 4,937,453 issued to Robert S. Nelson (the Nelson reference) in view of U.S. Patent No. 5,227,635 issued to Jan S. Iwanczyk (The Iwanczyk reference) and further in view of German patent DE 196 18 465 issued to Jahnke (The Jahnke reference).

Applicant requests that the Examiner reconsider and withdraw the above rejection of the claims in view of the following:

The applicable case law for a rejection under 35 U.S.C. §103 has been discussed above in the response to the first rejection under 35 U.S.C. §103. In the interests of brevity, Applicant requests the Examiner to note the above sections and consider that material incorporated herein by reference.

The Jahnke reference, like the Nelson reference, is discussed in the 'Background of Invention' section of the present Specification. As indicated, the Jahnke reference teaches an edge-on geometry of the detectors (similar to Figure 1 of the Nelson reference). The Jahnke reference does not teach or suggest moving the detectors to an angle of 10 degrees or less relative to the incident radiation.

Applicant also notes that claim 8 is a dependent claim that is ultimately dependent upon independent claim 3. To the extent that claim 8 is dependent upon independent claim 3, under the provisions of 35 U.S.C. §112, 4th paragraph, all of the limitations of the independent claim are expressly and inherently recited in claim 8. Applicant submits that the above arguments regarding the Nelson and Iwanczyk references are equally applicable to the rejection of claim 8 and therefore nothing in the Nelson reference alone or in combination with Iwanczyk and/or the Jahnke reference teaches or suggests the subject matter of claim 8.



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The undersigned representative authorizes the Commissioner to charge any additional fees under 37 C.F.R. 1.16 or 1.17 that may be required, or credit any overpayment, to Deposit Account No. 08-3038, referencing Order No. 06730.0010.NPUS00.

In order to facilitate the resolution of any issues or questions presented by this paper, the Examiner should directly contact the undersigned by phone to further the discussion.

Respectfully submitted,

A handwritten signature in black ink, appearing to read "Tracy W. Druce". The signature is fluid and cursive, with a large, stylized initial "T".

Tracy W. Druce
Patent Attorney
Reg. No. 35,493
Tel. 202.383.7398
Date: 14 Feb '03